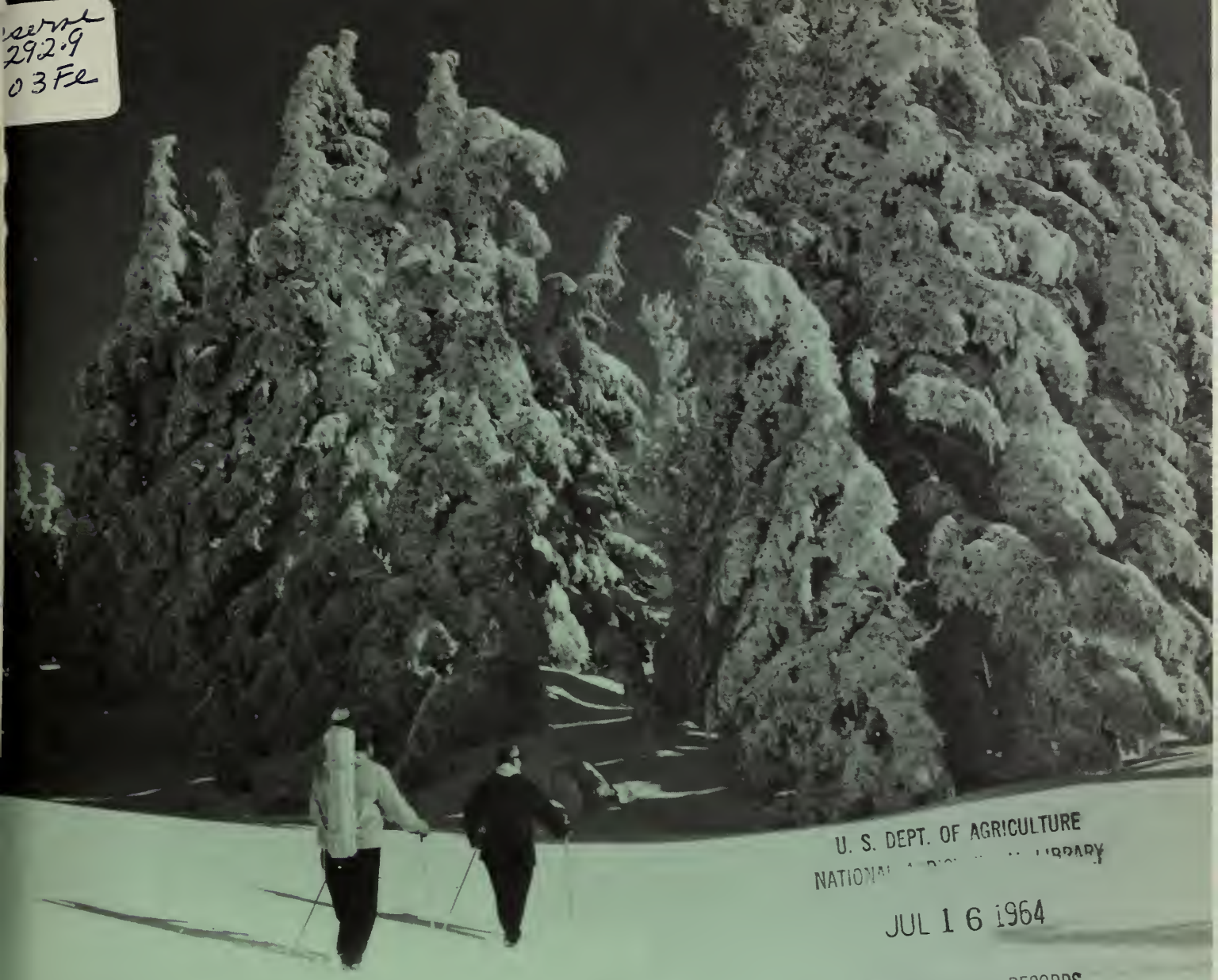

WATER SUPPLY OUTLOOK
and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS
for
WASHINGTON

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE,
and
DEPARTMENT of CONSERVATION STATE of WASHINGTON

Data included in this report were obtained by the agencies named above in cooperation with the U.S. Forest Service, U.S. Geological Survey, National Park Service, and other Federal, State and private organizations.

AS OF
JUNE 1, 1964

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

To Recipients of Water Supply Outlook Reports:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from advance estimates of the streamflow.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, up to 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1400 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

Streamflow forecasts are obtained by a comparison of total or maximum snow accumulation, as measured by snow water equivalent, to the subsequent spring and summer or snowmelt season runoff over a period of years. The snow water equivalent measured in selected snow courses provides most of the index to the streamflow forecast for the following season. More accurate forecasts are usually obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast procedure. Early season forecasts assume average climatic conditions through the snowmelt season.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions. Soil Conservation Service Reports may be secured from Water Supply Forecasting Unit, Soil Conservation Service, P.O. Box 2807, Portland, Oregon 97208.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	LOCATION	COOPERATING WITH
RIVER BASINS			
Western United States	Monthly (Feb.-May)	Portland, Oregon	All Cooperators
Basic Data Summary	October 1	Portland, Oregon	All Cooperators
STATES			
Alaska	Monthly (Mar.-May)	Palmer, Alaska	Alaska S.C.D.
Arizona	Semi-Monthly (Jan.15 - Apr.1)	Phoenix, Arizona	Salt R. Valley Water Users Assoc. Ariz. Agr. Exp. Station
Colorado and New Mexico	Monthly (Feb.-May)	Fort Collins, Colorado	Colo. State University Colo. State Engineer N. Mex. State Engineer
Idaho	Monthly (Jan.-June)	Boise, Idaho	Idaho State Reclamation Engineer
Montana	Monthly (Jan.-June)	Bozeman, Montana	Mont. Agr. Exp. Station
Nevada	Monthly (Jan.-May)	Reno, Nevada	Nevada Dept. of Conservation and Natural Resources - Division of Water Resources
Oregon	Monthly (Jan.-June)	Portland, Oregon	Oreg. State University Oregon State Engineer
Utah	Monthly (Jan.-June)	Salt Lake City, Utah	Utah State Engineer
Washington	Monthly (Feb.-June)	Spokane, Washington	Wn. State Dept. of Conservation
Wyoming	Monthly (Feb.-June)	Casper, Wyoming	Wyoming State Engineer

PUBLISHED BY OTHER AGENCIES

REPORTS	ISSUED	AGENCY
British Columbia	Monthly (Feb.-June)	Water Resources Service, Dept. of Lands, Forest and Water Resources, Parliament Bldg., Victoria, B.C., Canada
California	Monthly (Feb.-May)	Calif. Dept. of Water Resources, P.O. Box 388, Sacramento, Calif.

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FEDERAL-STATE-COOPERATIVE

SNOW SURVEY AND WATER SUPPLY FORECASTS

For

WASHINGTON

Report Prepared
By

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Soil Conservation Service
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Spokane, Washington

Issued By

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Soil Conservation Service
U. S. Department of Agriculture

Murray G. Walker, Supervisor
Division of Water Resources
Department of Conservation
State of Washington

WATER SUPPLY OUTLOOK

State of Washington
June 1, 1964

* *
* The water supply outlook for irrigation and power in the State of *
* Washington remains about the same as was reported last month. The *
* snowpack in the hills has not melted appreciably during the month *
* of May and in most areas in the state very little precipitation has *
* occurred during the month. Measurement of snow courses indicate *
* the snowpack is now from near normal to 600% of normal in certain *
* locations. Along the Cascade Range in the north and west, there *
* has been an improvement of the water supply; just across the Cas- *
* cades to the east there has been a lessening of prospective supply; *
* and elsewhere through the state there has been very little change. *
* *

The few snow courses that are measured on May 15 and June 1 indicate a well above normal snowpack for this time of year. There has been very little decrease in several of the high elevation snow courses from that which was measured on the 15th of May. Snow has fallen at many of these snow courses during the last 15 days which is very abnormal.

Temperatures have been considerably below normal during the month and very little melt has taken place. Forecasts of streamflow are generally what were reported last month but there is a possibility of less runoff in the Okanogan watershed and the southern portion of the Yakima watershed.

Runoff during the month of May throughout the state has all been well below normal with the exception of the Spokane River. Runoff varied from 45% of normal for the Methow River as measured near Pateros to a high of 113% for the Spokane as measured at Post Falls. Flow of the mainstem of the Columbia River has been 77% of normal at International Boundary, 79% at Grand Coulee, 77% at Trinidad and 79% at The Dalles.

Reservoirs throughout the state have less water in storage than normal for this time of year but the major stream reservoirs are expected to fill with the runoff when it occurs.

Soil moisture measurements near the first of June indicate generally less water in storage in the soil in the Crab Creek basin in Lincoln County, more water in storage in the Okanogan as measured near Trout Creek in Canada, less in the Yakima basin as measured at Cle Elum, and less in the Walla Walla as measured in the Blue Mountains.

RESERVOIR STORAGE - 1000 Acre Feet

BASIN or STREAM	RESERVOIR 1/	USABLE CAPACITY	Measured (June 1) 1964	1963	1962	Normal*
			COLUMBIA			
Spokane	Coeur d'Alene Lake	889.0	424.9	194.2	283.0	351.4
Columbia	Franklin D. Roosevelt Lake	5232.0	3370.0	4063.0	3487.0	4832.4
Columbia	Banks Lake 2/	761.8	320.0	281.0	521.3	---
Okanogan	Conconully Reservoir	13.0	5.1	11.2	6.6	---
Okanogan	Salmon Lake	10.5	---	8.1	8.3	---
Chelan	Lake Chelan	676.1	329.9	595.4	462.4	502.7
			YAKIMA			
Yakima	Keechelus Lake	157.8	106.3	160.0	159.1	139.9
Kachess	Kachess Lake	239.0	208.7	242.8	236.8	224.4
Cle Elum	Lake Cle Elum	436.9	241.6	442.5	439.4	416.3
Bumping	Bumping Lake	33.7	19.5	36.0	34.2	34.6
Tieton	Rimrock Lake	198.0	94.5	200.2	186.1	185.3
			PUGET SOUND			
Skagit	Ross Reservoir 2/	1202.9	827.6	1315.1	991.6	574.8
Skagit	Diablo Reservoir	90.6	84.1	85.9	84.6	85.9
Skagit	Gorge Reservoir	9.8	8.5	7.9	8.5	---

1/ Based on Active Storage

2/ Less than 15-year record in period 1943-57

* 15-year average 1943-57

SOIL MOISTURE - June

Drainage Basin and Station	Number	Elev.	Profile (Inches) Depth	Total Capacity	Soil Moisture Content (Inches) as of June 1 1964	1963	1962
CRAB CREEK							
Creston-Kunz	18B1m	2440	48	13.6	10.50	9.03	10.23
Govan	18B2m	2100	48	13.6	7.41	10.86	10.00
Jack Woods	18B3m	2600	48	13.6	6.67	8.94	7.23
Krause	18B4m	2440	48	13.6	8.43	8.74	9.22
Sheffels	18B5m	2360	48	13.6	4.85	6.62	5.39
Wheatridge	18B6m	2200	48	13.6	6.76	7.07	5.91
OKANOGAN							
Trout Creek	3-M	3600	48	7.3	5.34*	4.19*	4.88*
YAKIMA							
Lake Cle Elum	21B14M	2200	48	12.8	9.17	11.00	13.06
WALLA WALLA							
Couse	17C3m	3650	48	11.1	8.19	8.93	10.56
Helmers	17C2M	4400	48	12.0	11.17	11.19	12.57

* May 1 measurement

FALL SOIL MOISTURE

Drainage Basin and Station	Number	Elev.	Profile (Inches) Depth	Total Capacity	Soil Moisture Content (Inches) as of Oct. 1 1963	1962	1961
CRAB CREEK							
Creston-Kunz	18B1m	2440	48	13.6	5.12	9.40	4.25
Govan	18B2m	2100	48	13.6	5.79	9.95	5.60
Jack Woods	18B3m	2600	48	13.6	6.75	7.06	7.35
Krause	18B4m	2440	48	13.6	5.23	9.47	4.99
Sheffels	18B5m	2360	48	13.6	3.69	6.69	3.67
Wheatridge	18B6m	2200	48	13.6	4.50	7.49	4.09
OKANOGAN							
Trout Creek	3-M	3600	48	7.3	3.23	2.80	3.00
YAKIMA							
Lake Cle Elum	21B14M	2200	48	12.8	6.63	6.80	9.50
WALLA WALLA							
Couse	17C3m	3650	48	11.1	5.73	7.20	6.60
Helmers	17C2M	4400	48	12.0	5.75	7.60	6.90

APPENDIX 1

SNOW DATA - MAY 15 & JUNE 1, 1964

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT 1964 Date of Survey	1964 Snow Depth (In.)	1964 Water Content (In.)	Past Record Water Content (In.) 1963	1962	1943-57 Avg.
UPPER COLUMBIA DRAINAGE								
PEND OREILLE RIVER								
Nelson	Canada	3050	5/15	10	4.3	0.0	--	--
KETTLE RIVER								
Monashee Pass	Canada	4500	5/15	31	13.2	10.3	9.7	--
			5/29	17	8.8	0.0	1.3	--
OKANOGAN RIVER								
Aberdeen Lake	Canada	4300	5/14	1	0.2	--	--	--
Blackwall Mtn.	Canada	6250	5/14	98	49.2	32.1	26.9	--
			6/1	79	44.1	17.6	21.2	--
Bouleau Creek	Canada	5000	5/17	14	5.6	--	--	--
Brookmere	Canada	3200	5/15	6	3.1	--	--	--
Hamilton Hill	Canada	4900	5/15	28	13.4	4.1	2.5	--
			5/31	4	2.4	0.0	0.0	--
Lost Horse Mtn.	Canada	6300	5/14	41	13.9	8.0	11.4	--
			6/2	15	5.4	--	5.4	--
McCulloch	Canada	4200	5/14	4	1.8	0.4	0.8	0.7**
Missezula Mtn.	Canada	5100	5/14	18	6.3	0.0	0.9	--
			6/1	0	0.0	0.0	0.0	--
Mission Creek	Canada	4500	5/14	58	23.2	20.2	18.5	18.5**
			5/30	45	20.5	4.6	12.1	9.8**
Monashee Pass	Canada	4500	5/15	31	13.2	10.3	9.7	--
			5/29	17	8.8	0.0	1.3	--
Nickel Plate Mtn.	Canada	6200	5/16	33	11.8	--	--	--
Postill Lake	Canada	4500	5/14	8	2.9	--	--	--
Silver Star Mtn.	Canada	6050	5/15	70	33.0	23.3	19.9	23.0**
			5/31	40	24.8	5.6	9.1	12.5**
Trout Creek	Canada	4700	5/17	5	1.9	0.7	--	1.2**
WENATCHEE RIVER								
Stevens Pass	21B1	4070	5/13	154	72.7	27.3	42.2	43.9*
			6/2	121	60.3	7.5	25.2	27.1*

* Adjusted 1943-57 average
** Average for years of record

APPENDIX 2

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT 1964 Date of Survey	1964 Snow Depth (In.)	1964 Water Content (In.)	Past Record Water Content (In.) 1963	1962	1943-57 Avg.
YAKIMA RIVER								
Bumping Lake	21C8	3450	5/14	9	4.2	0.0	0.0	3.6*
			5/27	0	0.0	--	0.0	--
Lake Cle Elum	21B14M	2200	5/27	0	0.0	0.0	0.0	0.0*
#Stampede Pass	21B10	3000	5/15	146	63.1	16.2	26.7	31.8*
			6/2	121	61.9	0.0	11.4	15.5*
Tunnel Avenue	21B8	2450	5/14	47	24.5	--	0.0	9.3*
			5/27	25	13.9	--	0.0	2.8*
White Pass(Ea. Side)	21C28	4500	5/14	64	28.4	--	17.3	31.5*
			5/27	49	23.8	0.0	11.7	--
LOWER COLUMBIA DRAINAGE								
COWLITZ RIVER								
White Pass(Ea. Side)	21C28	4500	5/14	64	28.4	--	17.3	31.5*
			5/27	49	23.8	0.0	11.7	--
PUGET SOUND DRAINAGE								
GREEN RIVER								
Stampede Pass	21B10	3000	5/15	146	63.1	16.2	26.7	31.8*
			6/2	121	61.9	0.0	11.4	15.5*
SKYKOMISH RIVER								
#Stevens Pass	21B1	4070	5/13	154	72.7	27.3	42.2	43.9*
			6/2	121	60.3	7.5	25.2	27.1*
BAKER RIVER								
Dock Butte	21A11A	3800	5/15	210	106.6	46.6	62.6	--
			6/3	175	95.3	--	49.5	--
Easy Pass	21A7A	5200	5/15	271	136.6	75.2	85.6	--
			6/3	231	118.7	--	72.3	--
Jasper Pass	21A6A	5400	5/15	242	118.2	81.1	85.9	--
			6/3	210	109.0	--	77.7	--
Koma Kulshan	21A17	800	5/15	0	0.0	--	--	--

\# Not located directly on this drainage
* Adjusted 1943-57 average

APPENDIX 3

DRAINAGE BASIN and SNOW COURSE	No.	Elev.	SNOW COVER MEASUREMENT 1964 Date of Survey	1964 Snow Depth (In.)	1964 Water Content (In.)	Past Record Water Content (In.) 1963	1962	1943-57 Avg.
BAKER RIVER (Cont'd)								
Marten Lake	21A9A	3600	5/15	225	115.7	49.2	69.1	--
			6/3	190	104.8	--	60.5	--
Rocky Creek	21A12A	2100	5/15	64	29.3	--	--	--
			6/3	9	5.4	--	--	--
Schreibers Meadow	21A10A	3400	5/15	175	90.5	35.3	53.6	--
			6/3	146	76.0	43.4	40.9	--
S.F. Thunder Creek	21A14A	2200	5/15	0	0.0	--	--	--
Watson Lakes	21A8A	4500	5/15	192	94.4	49.9	58.7	--
			6/3	167	86.7	--	49.6	--
Sulphur Creek	21A13	1600	5/15	20	8.9	--	--	--
Three Mile Creek	21A15	1600	5/15	0	0.0	--	--	--

Agencies Assisting with Snow Surveys

GOVERNMENT AGENCIES

Canada:

Department of Lands, Forests and Water Resources,
Water Resources Service, British Columbia

States:

Washington State Department of Conservation
Washington State Department of Natural Resources

Federal:

Department of the Army
    Corps of Engineers
U. S. Department of Agriculture
    Forest Service
U. S. Department of Commerce
    Weather Bureau
U. S. Department of the Interior
    Bonneville Power Administration
    Bureau of Reclamation
    Geological Survey
    National Park Service

PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company

OTHER PUBLIC AGENCIES

Okanogan Irrigation District

MUNICIPALITIES

City of Walla Walla
City of Tacoma
City of Seattle

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE
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